

Claims 1 through 20 are cancelled.

Please add the attached new claims 21-44 to the specification.

IN THE ABSTRACT:

Please add the attached Abstract of the Disclosure to the specification.

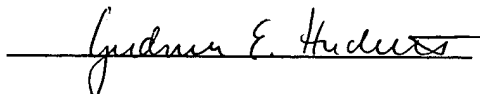
REMARKS

Claims 1-20 have been cancelled and replaced with claims 21-44 drafted in proper U.S. format. Proper headings according to the guidelines for drafting a nonprovisional patent application under 35 U.S.C. 111(a) have been added. A proper Abstract of the Disclosure has been added to the specification.

In view of the foregoing, it is submitted that this application is now in condition for allowance and such allowance is respectfully solicited.

Authorization is herewith given to charge any fees or any shortages in any fees required during prosecution of this application and not paid by other means to Patent and Trademark Office deposit account 50-1199.

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Encl.: new claims 21-44; pages 1, 3, and 4 (clean copies; marked-up version); Abstract

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MODULE FILTER COMPRISING AT LEAST ONE ADMISSION FOR THE
NON-FILTRATE AND AT LEAST ONE DISCHARGE FOR THE FILTRATE AND
COMPRISING AT LEAST ONE FILTER MODULE

The invention relates to a module filter with at least one admission for the non-filtrate and a discharge for the filtrate and with at least one filter module of the kind defined in the preamble of claim 1.

From EP 0 233 999 A a filter module is known in which the filter cells and support bodies are stacked alternately along a central pipe. Support structures are also provided in the filter cells which support the filter material of the filter cells. The non-filtrate is guided from the exterior into the filter cells, and the filtrate is discharged via the interior of the filter cells and via the central pipe. A disadvantage in this connection is that, on the one hand, the support bodies prevent a uniform entry of the non-filtrate into the filter cells and, on the other hand, the filtered materials deposit on the support bodies between the filter cells and on the entire interior chamber of the module filter.

The present invention has the object to provide a module filter of the kind defined in the preamble of claim 1 which, with minimized apparatus expenditure, enables a complete separation of the filtrate from the non-filtrate, wherein the separated solids can be disposed of completely and residue-free without necessitating cleaning of the module filter.

This object is solved by a module filter with the features of claim 1.

The important advantages of the subject matter of the invention are to be seen in that the inflow of the non-filtrate into the filter module is realized via a central

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

The complete filter apparatus is of a very simple configuration and requires minimal investment costs even in connection with high corrosion requirements. The filter modules are connected according to the principle of the prior patent application 197 44 574.8, i.e., by adaptors, which engage the connecting rings of the filter modules. In another embodiment, a central rod takes over several tasks. It serves, on the one hand, for fixing the filter modules stacked in the filter container in that it is guided through their central openings. Moreover, it serves as a tie rod for a lid with press plate at the upper end of the filter module layer in that it is supported by means of a fastening arrangement, in particular, a bayonet closure, on the bottom plate of the module filter. With cooperation of the sealing rings positioned between the filter modules, the filter modules are sealed relative to one another. In another embodiment, a sealing element for sealing relative to the container bottom and the container cover is eliminated because the filter material at these connecting locations is already shaped to have a sealing profile which matches correspondingly profiled surfaces on the container bottom and the container cover. However, the central rod serves particularly as an admission for the non-filtrate which can reach the filter cells via openings in its mantle surface. Usually, a container is placed about the stacked filter modules which, in turn, can be of a light construction because, viewed in the direction of the fluid flow, it is positioned at the almost pressure-free discharge side. The container has only a guiding and shielding function relative to the filtrate flow. When using a central rod, the filter modules are stripped of the central rod and disposed of for removal of the solids. Otherwise, the filter modules are individually decoupled and disposed of.

Embodiments of the invention will be explained in the following in more detail with the aid of the drawing. In the drawing it is shown in:

Fig. 1 the schematic illustration of an axial section of a module filter;

Fig. 2 a cross-section of a filter module according to the Invention;

Fig. 3 a detail of a plan view onto a drainage support body;

Fig. 4 a section along the line IV-IV of Fig. 3;

Fig. 5 a plan view onto a support ring;

Fig. 6 a cross-section of a support ring;

Fig. 7 a view VII onto a support ring;

Fig. 8 a cross-section of a filter module secured at the container cover and container bottom in the embodiment without module seal;

Fig. 9 a detail with two variants of pressing devices for the drainage cover plate.

In Fig. 1, a module filter 1 for the filtration of liquids, such as chemical suspensions or wine, beer and juice, is illustrated. It is comprised of the container 2 with housing 3 and bottom 4. The housing 3 is secured by means of mushroom head anchor screws 5 in a pressure-tight way on the bottom 4. In the container a central rod 33 is secured on the bottom 4 by means of a fastening arrangement 15 which is formed, in particular, as a bayonet closure.

The filter modules 8 are arranged with their central openings 10 axially aligned on top of one another and form a central channel 28 at their center. The filter modules 8 are sealed relative to one another by sealing rings 19 and by a drainage cover plate 34 which is supported either by means of a support cap 12 with support ribs

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MODULE FILTER COMPRISING AT LEAST ONE ADMISSION FOR THE NON-FILTRATE AND AT LEAST ONE DISCHARGE FOR THE FILTRATE AND COMPRISING AT LEAST ONE FILTER MODULE

Background of the Invention

The invention relates to a module filter with at least one admission for the non-filtrate and a discharge for the filtrate and with at least one filter module ~~of the kind defined in the preamble of claim 1.~~

From EP 0 233 999 A a filter module is known in which the filter cells and support bodies are stacked alternately along a central pipe. Support structures are also provided in the filter cells which support the filter material of the filter cells. The non-filtrate is guided from the exterior into the filter cells, and the filtrate is discharged via the interior of the filter cells and via the central pipe. A disadvantage in this connection is that, on the one hand, the support bodies prevent a uniform entry of the non-filtrate into the filter cells and, on the other hand, the filtered materials deposit on the support bodies between the filter cells and on the entire interior chamber of the module filter.

Summary of the Invention

The present invention has the object to provide a module filter of the aforementioned kind ~~defined in the preamble of claim 1~~ which, with minimized apparatus expenditure, enables a complete separation of the filtrate from the non-filtrate, wherein the separated solids can be disposed of completely and residue-free without necessitating cleaning of the module filter.

This object is solved by a module filter ~~with the features of claim 1~~ wherein that the central channel is connected to an admission for the non-filtrate and connected with the inner

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space of the filter cells and in that a space surrounding the filter cells is formed within the container housing which is connected with the discharge for the filtrate, and in that the support bodies are formed as drainage support bodies which extend at least approximately over the entire surface area of the filter cells, wherein in the drainage support body a plurality of drainage channels are provided which extend toward the outer rim of the filter cells or the drainage support bodies.

The important advantages of the subject matter of the invention are to be seen in that the inflow of the non-filtrate into the filter module is realized via a central

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The complete filter apparatus is of a very simple configuration and requires minimal investment costs even in connection with high corrosion requirements. The filter modules are connected according to the principle of the prior patent application 197 44 574.8, i.e., by adaptors, which engage the connecting rings of the filter modules. In another embodiment, a central rod takes over several tasks. It serves, on the one hand, for fixing the filter modules stacked in the filter container in that it is guided through their central openings. Moreover, it serves as a tie rod for a lid with press plate at the upper end of the filter module layer in that it is supported by means of a fastening arrangement, in particular, a bayonet closure, on the bottom plate of the module filter. With cooperation of the sealing rings positioned between the filter modules, the filter modules are sealed relative to one another. In another embodiment, a sealing element for sealing relative to the container bottom and the container cover is eliminated because the filter material at these connecting locations is already shaped to have a sealing profile which matches correspondingly profiled surfaces on the container bottom and the container cover. However, the central rod serves particularly as an admission for the non-filtrate which can reach the filter cells via openings in its mantle surface. Usually, a container is placed about the stacked filter modules which, in turn, can be of a light construction because, viewed in the direction of the fluid flow, it is positioned at the almost pressure-free discharge side. The container has only a guiding and shielding function relative to the filtrate flow. When using a central rod, the filter modules are stripped of the central rod and disposed of for removal of the solids. Otherwise, the filter modules are individually decoupled and disposed of.

Brief Description of the Drawings

Embodiments of the invention will be explained in the following in more detail with the aid of the drawing. In the drawing it is shown in:

Fig. 1 the schematic illustration of an axial section of a module filter;

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- Fig. 2 a cross-section of a filter module according to the Invention;
- Fig. 3 a detail of a plan view onto a drainage support body;
- Fig. 4 a section along the line IV-IV of Fig. 3;
- Fig. 5 a plan view onto a support ring;
- Fig. 6 a cross-section of a support ring;
- Fig. 7 a view VII onto a support ring;
- Fig. 8 a cross-section of a filter module secured at the container cover and container bottom in the embodiment without module seal;
- Fig. 9 a detail with two variants of pressing devices for the drainage cover plate.

Description of Preferred Embodiments

In Fig. 1, a module filter 1 for the filtration of liquids, such as chemical suspensions or wine, beer and juice, is illustrated. It is comprised of the container 2 with housing 3 and bottom 4. The housing 3 is secured by means of mushroom head anchor screws 5 in a pressure-tight way on the bottom 4. In the container a central rod 33 is secured on the bottom 4 by means of a fastening arrangement 15 which is formed, in particular, as a bayonet closure.

The filter modules 8 are arranged with their central openings 10 axially aligned on top of one another and form a central channel 28 at their center. The filter modules 8 are sealed relative to one another by sealing rings 19 and by a drainage cover plate 34 which is supported either by means of a support cap 12 with support ribs